University of Alberta

Validation and Application of the Child and Adolescent Social Perception Measure

by

Cynthia J. Koning

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Master of Science

Department of Occupational Therapy

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Cyndie Koning.

Cyndie Koning
12514-106 Avenue
Edmonton, Alberta
T5N 0Z6

Date: Aug. 28, 1997

University of Alberta

Faculty of Graduate Studies and Research

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled Validation and Application of the Child and Adolescent Social Perception Measure in partial fulfillment of the requirements for the degree of Master of Science.

Dr. Joyce Magill-Evans (Ph.D.)

Dr. Megan Hodge (Ph.D.)

Dr. Kerrie Pain (Ph.D.)

Dr. Chris Paniak (Ph.D.)

Dr. Sharon Warren (Ph.D.)

Date: July 14, 1997

This degree is dedicated to my dad who encouraged
me to search for knowledge and wisdom.

Abstract

The Child and Adolescent Social Perception Measure (CASP) was developed to assess the ability to identify the emotions of others based on nonverbal cues. Adolescent boys with social skill deficits consistent with the diagnosis of Asperger's Disorder (AD) were compared to controls matched on age and IQ. Significant differences were found between groups on CASP scores. Correlations between CASP scores and general social skills scores were moderate and positive; lower significant correlations were found with language scores; and significant negative correlations were found with problem behavior scores. Validity for the CASP was demonstrated by the measure's ability to distinguish differences between groups and by correlations between scores on the CASP and scores on constructs related to social perception.The social and language skills of boys who met Diagnostic and Statistical Manual-Fourth Edition criteria for AD are described. Implications for assessment and treatment of social skill deficits are discussed.

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Chapter 1

Introduction

Occupational therapists working with both physical and psychosocial dysfunction include the measurement and treatment of social skills within their scope of practice (Doble, Bonnell, & Magill-Evans, 1991; Kielhofner & Barris, 1984). A conceptual framework for understanding social interaction has been developed by Doble and Magill-Evans (1992) as a guide for therapists. A theoretical understanding of the components of social interaction and the role of associated variables is critical to beginning the process of assessment and intervention.

The model of social interaction proposed by Doble and Magill-Evans (1992) (see Figure 1.1) postulates that the individual's social enactment skills are only one part of an open system. The process of social interaction is envisioned as a feedback loop in which the individual receives and selectively attends to social information in the environment (reception of social messages), interprets the message based on contextual information, plans and chooses an appropriate response, and then produces the social enactment skills specific to the environmental context. This model also suggests that variables such as interaction style, cognitive abilities, and volition (motivation) may impact on social processes.

This model is used by occupational therapists to identify specific social interaction deficits (Koning, Manyk, Magill-Evans, & Cameron-Sadava, 1997). Although considerable attention has been focused on the assessment and treatment of social enactment skills, social processing components have received increased attention

recently. The ability to receive and interpret social cues is more commonly known as social perception. Social perception is defined as the ability to infer the affective state of others based on multiple cues. Doble and Magill-Evans (1992) suggest that social information is received from both verbal and nonverbal sources. Interpretation of social information from nonverbal sources such as context, facial expression, tone of voice and gesture is based on how well we are able to filter out irrelevant cues and attend to the most relevant cues. Thus, an individual's social perception is affected by the ability to perceive multiple cues presented simultaneously, within a particular social context. The primary assumption of research on social perception is that it is related to other areas of social interaction and that individual differences in social perception contribute to success in social interaction.

Age, gender, and IQ may also contribute to social perception ability. Considerable developmental research has focused on examining various components of social perception. The developmental nature of the skills of recognizing and labeling emotions based on facial expressions (e.g., Harrigan, 1984), vocal cues (e.g., Johnson, Emde, Scherer, & Klinnert, 1986), gesture and physical proximity (e.g., Ekman & Friesen, 1969), and context (e.g., Reichenbach & Masters, 1983) has been clearly demonstrated. Studies which indicate differences in social perception related to gender have been reviewed by Hall (1984) who concluded that females were better than males at decoding nonverbal social cues. Several more recent studies have not found gender differences or have found only minimal differences in children (Boyatzis & Satyaprasad, 1994; Nowicki & Duke, 1994). The relationship between social perception and IQ has been examined in

a review of 22 studies by Halberstadt and Hall (1980) who found the prevailing result to be a small but positive correlation between these two variables.

The Child and Adolescent Social Perception measure (CASP) (Magill-Evans, Koning, Cameron-Sadava, & Manyk, 1995) was developed to measure social perception in a manner compatible with the social interaction model presented by Doble and Magill-Evans (1992). Measures of social perception in children developed prior to the CASP did not reflect a conceptual understanding of the complexity of social interaction (Nowicki & Duke, 1994; Shapiro, Hughes, August, & Bloomquist, 1993). The CASP assesses the ability to infer emotions from cues which are presented simultaneously and requires children to generate responses rather than choose a label for a particular emotion. The CASP's scores measure both the number and type of cues that children recall using to infer emotions. Situations that children and adolescents commonly encounter in real life are portrayed in the CASP. The CASP has standardized scoring and provides preliminary reliability and validity information in the manual (Magill-Evans et al., 1995). The authors have suggested that results of testing with the CASP should be interpreted with caution until more studies of the CASP's psychometric properties are completed.

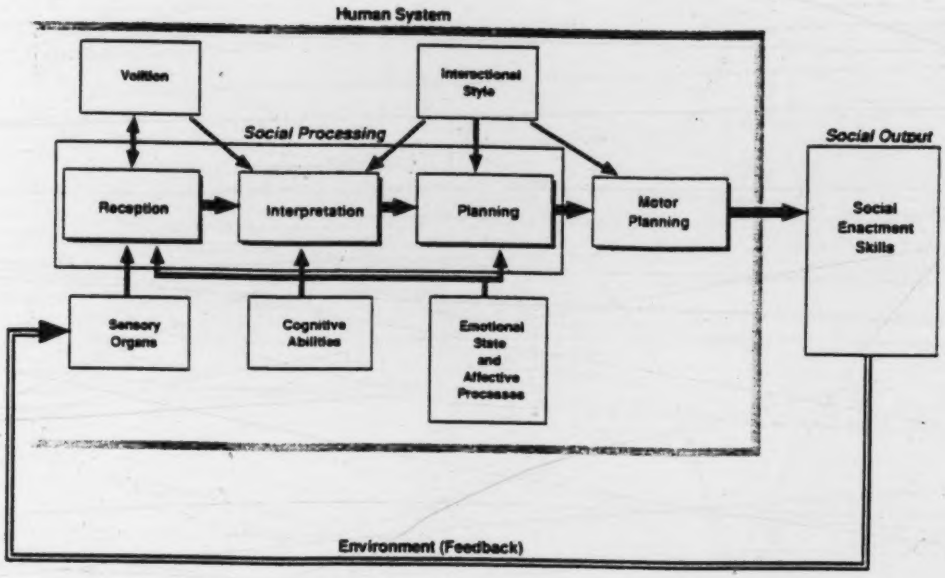
The primary focus of Chapter 2 is to provide additional construct validation of the CASP in two areas: differences between groups and correlations with other measures. This study addresses the construct validity of the CASP by determining if there are clear differences in CASP scores between a population whose clinical presentation includes poor social perception and a comparison group, matched on age, gender, and an estimate of IQ, who do not appear to have deficits in social perception. In addition, construct

validity is assessed by examining the correlations between CASP scores and scores of constructs thought to be related to social perception, including general social skills, language skills and internalizing and externalizing behavior. Implications for the CASP's clinical utility are discussed.

Chapter 3 describes the social and language skills of a specific population of adolescent boys whose diagnosis clearly indicates nonverbal social deficits. A subgroup of the sample used for the first study was selected using both the Diagnostic and Statistical Manual of Mental Disorders - Fourth Edition (DSM-IV) (American Psychiatric Association, 1994) and the Screening Questionnaire for Asperger's Disorder (Ehlers & Gillberg, 1993). This study examines the clinical utility of the CASP for identifying social perception deficits and provides standardized measurement of descriptive diagnostic criteria related to social skills in Asperger's Disorder.

Occupational therapists who routinely include improved social interaction as an intervention goal need to consider how the components of social interaction are being measured. These studies determine if the CASP can be used as part of the assessment of social interaction skills. Validation of the CASP is necessary as a precursor to using the CASP as an outcome measure in social skills groups aimed as increasing social perception. Validation of the CASP with children identified as having social perception deficits will make possible additional research related to prediction of success in peer interactions, differences in social perception between diagnostic groups, and the relationship of social perception to other variables.

Figure 1.1. Model of social interaction.



Doble, S., & Magill-Evans, J. (1992). A model of social interaction to guide occupational therapy practice. Canadian Journal of Occupational Therapy, 58, 241-249.

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Chapter 2

Validation of the Child and Adolescent Social Perception Measure

The ability to recognize nonverbal social cues is essential to human interaction. Nonverbal cues are implicit messages embedded in how we communicate (Smith, Archer, & Costanzo, 1991). Researchers and clinicians who work with children with social interaction deficits have focused increasing attention on the ability to perceive and interpret nonverbal social cues. A model of social interaction developed by Doble and Magill-Evans (1992) helps us understand the various components of social interaction (see Figure 1.1). This model examines social processing and social performance, as well as factors influencing these areas. Of interest here are two internal social processes which in combination describe social perception. The first process involves the use of "receiving skills," or the ability to selectively attend to and accurately perceive information from the environment. Other authors (e.g., Riggio, 1986) have identified this as social or emotional sensitivity. The second process, interpretation, allows the individual to make sense of the social message received. Social perception is limited here to the ability to infer the affective state of others based on nonverbal cues. This ability allows individuals to interpret social information provided not only by what is said but, particularly, the manner in which it is expressed. The model also conceptualizes the individual as an open system in which social processing (including social perception) and social output are affected by cognitive skills such as language comprehension and perspective taking, emotional and affective processes, interaction style, motivation, and sensory information.

Research on social perception in children has established its central role in interpersonal functioning (Boyatzis & Satyaprasad, 1994; Custrini & Feldman, 1989; Nowicki & Duke, 1994; Phillipot & Feldman, 1990). The relationship between social perception and general social functioning has been demonstrated in studies which have found that social perception abilities vary with popularity (Boyatzis & Satyaprasad; Stiliadis & Weiner, 1989), assertiveness (Barrett & Radke Yarrow, 1977), and general social skills as rated by a parent or teacher (Cartledge, Stupay, & Kaczala, 1986; Phillipot & Feldman; Russell, Stokes, Jones, Czogalik, & Rohleder, 1993). Social perception deficits have been described in children with learning disabilities (Jackson, Enright, & Murdock, 1987), emotional or behavioral disorders (Russell et al.; Walker & Leister, 1994), attention deficit hyperactivity disorder (Shapiro, Hughes, August, & Bloomquist, 1993), and autism (Feldman, McGee, Mann, & Strain, 1993). This research suggests that social perception plays a critical role in children's social competence and that social perception deficits are important in understanding why some children experience difficulties in social interaction.

Understanding of social perception deficits has been restricted by methodological concerns related to how social perception should be measured, and the availability of standardization and normative data. Many researchers (e.g., Nowicki & Duke, 1994; Shapiro et al., 1993; Walker & Leister, 1994) address measurement of social perception by examining separate channels such as facial expression, gestures, and tone of voice. However, research measuring social perception in adults has pointed out the importance of presenting multiple nonverbal cues simultaneously. Using a forced-choice and free-

response format, Hellewell, Connell, and Deakin (1994) used short videotaped vignettes to examine differences in the ability of adult schizophrenic subjects to judge affect. Archer and Akert (1977) described a measure which uses the simultaneous presentation of nonverbal cues within a naturalistic context. More recently, Trimboli and Walker (1993) presented a compelling argument criticizing measurement methodology based on presenting nonverbal cues separately. They suggested that measurement of social perception must consider how social information is received and integrated in context using multiple cues.

Recent studies with children (Nowicki & Duke, 1994; Shapiro et al., 1993) have attempted to address developmental and validity issues in two new measures. These measures do not, however, address how nonverbal cues are presented in normal social interactions. Like many previous studies, these measures examine separate channels of nonverbal cues which allows one to determine the child's ability to understand cues in isolation. However, they do not allow one to assess how the child interprets cues presented simultaneously.

A recently developed measure of social perception, the Child and Adolescent Social Perception (CASP) measure (Magill-Evans, Koning, Cameron-Sadava, & Manyk, 1995), has attempted to overcome issues related to measuring social perception in children by providing age based norms; establishing inter-rater reliability, test-retest reliability and internal consistency; and examining social perception within a semi-naturalistic context. The process of validation has been partially addressed by examining correlations between the CASP and a measure of expressive language (nonsignificant

correlation). Factor analysis done with information from 212 children has indicated that the CASP measures one underlying dimension. Further validation efforts are necessary to demonstrate the measure's effectiveness in identifying children whose social perception deficits appear to have a negative impact on their ability to function socially. Accurate identification of social perception deficits will contribute to effective treatment planning and outcome measurement.

The present study was designed to examine the construct validity of the CASP. Dunn (1989) suggests that there are five areas to consider in construct validation: age differentiation, factor analytic study, internal consistency of the instrument, correlation with other tests, and differences between groups. The first three areas have begun to be addressed by Magill-Evans et al. (1995). The last two areas are the focus of this paper.

Evidence of the validity of the CASP would be demonstrated by the ability to discriminate between children known to have social perception deficits and children without apparent social perception deficits. Recent studies have examined social perception deficits in children diagnosed with psychopathology or behavior disorders. Differences in the social perception abilities of children with psychopathology have been described in a study by Russell and associates (1993) which examined the ability of boys to identify, classify and predict nonverbal displays. They found that boys referred to a community mental health clinic were less able to decode affective expression than boys sampled from elementary school populations. Similar results were described by Walker and Leister (1994).

To control for other variables which might explain differences in social perception, a relatively homogeneous group with identified social perception deficits was required. Recent literature describing children with Asperger's Disorder (AD) document social perception deficits as a primary characteristic (Gillberg, 1989; Szatmari, Archer, Fisman, Streiner, & Wilson, 1995; Tantam, 1988). Nonverbal impairments are one criteria for diagnosis in this population using both the Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition (DSM-IV) (American Psychiatric Association, 1994) and the International Classification of Diseases-Tenth Edition (ICD-10), (World Health Organization, 1990). The CASP's ability to detect significant individual differences in social perception between this population and a control group would provide considerable support for the measure's construct validity.

Correlations with other tests which measure constructs related to social perception would further confirm the validity of the CASP and provide insight regarding the relationship these constructs have with social perception. The previous findings of a relationship between social perception and general social skills suggests that children who are perceived by their parents and teachers as more adept at interpersonal interactions will also be more competent at decoding the affective content of nonverbal cues. Nowicki and Duke (1994) found that teacher ratings of the social behavior of students was significantly correlated with the child's ability to interpret facial expressions, paralanguage and postures. Support for a positive relationship between general social competence and social perception is also drawn from literature examining whether social competence varies with level of social adjustment and the ability to

decode facial expressions (Feldman, White, & Lobato, 1982; Walker, 1981).

Understanding the relationship between social perception and receptive and expressive language is also important for the validity of the CASP. Are scores on the CASP a true measure of social perception or are they confounded by the language demands of the measurement method? Listening comprehension and speaking vocabulary would affect the child's ability to respond appropriately on the CASP which requires that the child understand the questions asked and generate appropriate responses. To rule out language deficits as a possible explanation for poor social perception as measured by the CASP, expressive and receptive language skills need to be considered.

The relationship of social perception and language skills has not, however, been systematically examined in the literature. Courtright and Courtright (1983) compared typical children and children with language disorders on their ability to interpret emotional meaning from vocal cues such as loudness and intonation. Results indicated that language disordered children were less accurate in identifying vocal cues. From the perspective of the Doble and Magill-Evans' (1992) model, flexibility of language use, retrieval, organization, inferencing, and an understanding of the multiple meaning of words would all have an impact on social processing. Abnormalities in social perception would seem to be theoretically linked to deficits in referential communication (Lloyd, 1994) and pragmatic aspects of communication (Prutting & Kirchner, 1983). Researchers have described populations which appear to have both language deficits and difficulty expressing and understanding nonverbal social cues (Trauner, Ballantyne, Chase, & Tallal, 1993). An understanding of the extent to which expressive and receptive language

are related to social perception is important for both assessment and intervention related to social perception.

The relationship of problem behaviors, referred to as externalizing (acting out, problems with impulse control) and internalizing (anxiety, social withdrawal, depression) behaviors, to social perception is also important for the validity of the CASP. Although there is little research examining this relationship, Russell and associates (1993) suggest that children with externalizing behaviors have more difficulty decoding nonverbal cues. Walker and Leister (1994) found that adolescents with externalizing and internalizing disorders were relatively inaccurate at recognizing emotions, with the exception of disgust. Adolescents with internalizing disorders were less accurate at recognizing sadness and disgust compared to adolescents with externalizing disorders. The relationship between elevated externalizing and internalizing scores and social perception as measured by the CASP needs to be evaluated using the model of social interaction. Externalizing and internalizing problem behaviors would likely impact social processing by affecting how cues are perceived and interpreted. Conversely, poor social perception may result in social withdrawal or acting out.

Hypotheses

This study was conducted to evaluate the validity of the CASP by determining support for the following hypotheses:

1. There are significant differences in CASP scores between adolescent boys referred with social perception deficits consistent with the diagnosis of Asperger's Disorder and

adolescent boys without social interaction deficits who were matched on age and an estimate of IQ.

2. Correlations between general social skills, as measured using the Social Skills Rating System (SSRS) (Gresham & Elliott, 1990), and CASP scores are significant, positive and moderate.

3. Correlations between expressive and receptive language, as measured using the Clinical Evaluation of Language Fundamentals - Revised (CELF-R) (Semel, Wiig, & Secord, 1987), and CASP scores are significant, positive and low.

4. Correlations between externalizing problem behaviors, as measured using the Child Behavior Checklist (Achenbach, 1991), and CASP scores are significant, negative and moderate; that is, as CASP scores increase externalizing problem behaviors decrease. There is a similar relationship between internalizing problem behaviors and CASP scores.

Method & Procedures

Participants

Sixty-one males between the ages of 12 to 15 participated in the study. The study was limited to males as there are relatively few females diagnosed with AD (Ehlers & Gillberg, 1993) and social perception has been shown to be related to gender. All participants spoke English as their first language; 58 participants were Caucasian and 3 were non-Caucasian. The clinical group consisted of 32 boys recruited from the caseloads of local psychiatrists. These participants presented with social skill deficits consistent with but not limited to a definite diagnosis of AD. Referring psychiatrists completed a checklist developed by Ehlers and Gillberg (1993) for screening AD. All 32 boys had

significant social deficits with 21 meeting the strictest criteria for AD (Koning & Magill-Evans, 1997). Clinical participants' mean age was 13.92 years (see Table 1). Subjects who presented with a history of psychosis were excluded.

The comparison group consisted of 29 boys recruited from several community schools. Teachers were asked to recruit students without apparent social skill deficits. Their mean age was 13.96 years (see Table 2.1); this was not significantly different from the clinical group.

Table 2.1

Means and Standard Deviations for Matching Variables

	M (SD)	
Variable	Clinical Group	Community Group
Age (years)	13.92 (1.10)	13.96 (.85)
WISC Vocabulary Score (standard score)[a]	10.25 (3.22)	10.79 (2.23)
Socioeconomic Index (Father)	36.19 (21.13)	41.73 (15.06)

[a]standard score mean = 10

Estimates of family socioeconomic status (SES) were determined using the socioeconomic index for occupations in Canada (Blishen, Carroll, & Moore, 1987). No significant differences were found between groups on SES (see Table 2.1). The groups did not differ on the Weschler Intelligence Scale for Children-Third Edition (WISC III) (Weschler, 1991) vocabulary subtest (see Table 2.1). The groups were unequal because we had difficulty recruiting community boys who fell within the required age and

vocabulary range. Community boys with vocabulary subtest standard scores greater than 14 were difficult to recruit.

Measures

Child and Adolescent Social Perception measure (CASP) (Magill-Evans et al., 1995). The CASP consists of 10 videotaped scenes, depicting situations that children and adolescents frequently encounter. Each scene contains two to five actors and lasts 19 - 40 seconds. After each scene the student identifies the emotions portrayed by each of the characters. Using the labels identified by the student, the examiner asks the student which cues he/she used to identify the emotions. Two scores are obtained: the emotion score (ES) which is based on the ability to correctly label the emotions and the nonverbal cues score (NCS) which is based on the ability to correctly identify the cues present in the scene that were used to infer the emotions. In the normative study, ES scores correlated with nonverbal cues scores at .88. Significant main effects were found for age and gender, with older children scoring significantly better than younger children and girls scoring better than boys. Acceptable levels of internal consistency (r = .88, .92), test-retest reliability (r = .83, .87), and inter-rater reliability (r = .95) were reported. No significant correlations were found between scores on the CASP and the Expressive One-Word Picture Vocabulary Test (Gardner, 1990).

Social Skills Rating System (SSRS) (Gresham & Elliot, 1990). This measure provides a standardized assessment of social skills reported from three sources: student, parent, and teacher. Standard scores have a mean of 100 and a standard deviation of 15; there are no standard scores for subtest means. Using a questionnaire format, respondents

report how frequently a particular behavior is performed using a scale of 0 to 2. The number and composition of the subscales vary depending on the source of the information. The manual reports internal consistency estimates ranging from .84 to .95. Test-retest reliability for the total scores was .85 for the teacher form, .87 for the parent form, and .67 for the student form. The authors suggest that the multi-rater approach provides unique perspectives on the student being rated and thus inter-rater reliability between students, teachers, and parents should not be expected to be high. Correlations were .33 (teacher with parent), .36 (parent with student), and .41 (teacher with student). Demaray and colleagues (Demaray, et al., 1995) compared six published measures of social skills in preschool and school-aged children on content and use, standardization, scores and interpretation, and psychometric properties. They determined that the SSRS was the most comprehensive instrument. The ability of the SSRS teacher form to discriminate between students with mild behavior disorders, severe emotional disorders and no handicap has been demonstrated in a study by Stinnett, Oehler-Stinnett, and Stout (1989).

Clinical Evaluation of Language Fundamentals - Revised (CELF-R) (Semel et al., 1987). This measure provides a standardized evaluation of language skills, including semantics, morphology, syntax (word and sentence structure), recall, and retrieval. It was designed to provide measures of both receptive and expressive language as well as a composite score. Standard scores have a mean of 100 and a standard deviation of 15. Three subtests are combined to compute the receptive language score and three other subtests are combined to compute the expressive language score. This test is administered

by reading specific items which require the child to choose a response, generate a response, or recall. The manual reports internal consistency coefficient estimates for receptive, expressive and total language scores ranging from .86 to .94 for 12- to 15-year-olds. Test-retest reliability was .63 (receptive), .79 (expressive), and .77 (total language score). Inter-rater reliability scores for individual subtests ranged from .82 to .99. This measure is used extensively in clinical assessments (Beck, 1996) and in research examining language deficits (e.g., Naylor, Staskowski, Kenney, & King, 1994; Trautmen, Giddan, & Jurs, 1990).

Child Behavior Checklist (CBCL) (Achenbach, 1991). This measure provides a standardized description of problem behaviors from two sources: the teacher and the parent. The CBCL uses a questionnaire format in which the parent or teacher must report the frequency of a particular behavior using a scale of 0 to 2. The CBCL provides normalized T scores which are based on percentiles up to the 97th percentile (T = 70) (e.g., a score of 50 is equal to the 50th percentile). The clinical cutpoint was established at T = 60, with the borderline clinical range including T scores of 60 to 63. Intraclass correlation coefficients reported for test-retest reliability are all in the .90s. Interparent agreement for boys aged 12-18 was .70 for the internalizing score, .77 for the externalizing score, and .77 for the total problems score. Content, criterion, and construct validity have been extensively documented in the measure's manual (Achenbach, 1991). The internalizing and externalizing T scores were used in this study.

Procedures

Prior to assessment, all participants completed the vocabulary subtest of the WISC III. The literature suggests that IQ needs to be considered when comparing groups for differences in social perception. A review of 22 studies using various measures of IQ found the prevailing result to be a small but significant positive correlation between IQ and nonverbal judging skill (Hallberstadt & Hall, 1980). Correlations between the vocabulary subtest and full scale WISC III scores for the age group of 12 - 15 years ranged from .79 to .85. Full scale IQ has been estimated using this subtest in a study by Paniak, Miller, and Murphy (1994). The use of the vocabulary subtest also serves the purpose of ruling out vocabulary as a simple explanation for differences in social perception between groups. The vocabulary subtest of the WISC III was administered to boys who were within 6 months of chronological age of a participant with AD. Community group participants who were within 1 standard error of measurement of a clinic group participant were asked to participate in the full assessment process. This was done to ensure that the groups were matched on age and the IQ estimate (see Table 2.1). WISC III vocabulary scores have a standard score mean of 10, a standard error of measurement of between .90 and .99 for ages 12 to 15, and a standard deviation of 3. Students were compared to normative data presented in 3 month increments.

The CASP was individually administered by trained research assistants who had achieved inter-rater reliability of .80 or greater. Inter-rater reliability was checked periodically during the course of the study and was found to be above 89% for both the ES and the NCS. A speech-language pathologist administered the CELF-R. These tests

were administered individually at a location convenient to the participant in two 1 hour blocks; total testing time did not exceed two hours. General social skills were measured using the student, parent and teacher forms of the SSRS. Participants completed the SSRS after completing the CASP. General problem behaviors were measured using the parent and teacher forms of the CBCL. One parent (53 mothers, 3 fathers, 1 grandfather) either completed these checklists in another room while their son was being assessed on the CASP or returned completed forms by mail. Each participant was asked to identify the teacher who knew him best; this teacher was asked to complete the teacher forms of the CBCL and the SSRS. The sample size in some analyses varies as it was not possible to obtain parent and teacher forms in all cases. The greatest number of missing forms was the CBCL teacher form (n = 7).

Results

Differences between the clinical and community groups were tested for the CASP ES scores and the NCS scores using t-tests. Alpha level was set at .01 to control for Type I error as several t-tests were done. Means and standard deviations are reported in Table 2.2. As predicted, the community sample scored significantly higher than the clinical group on both the CASP ES, t (59) = 11.08, $p < .001$, and on the CASP NCS, t (59) = 8.73, $p < .001$.

A discriminant analysis was performed using a linear combination of the ES and NCS as the independent variables and group membership as the dependent variable to determine how well these scores can be used to classify cases into clinical and community groups (see Table 2.3). Canonical discriminant functions evaluated at group

means were -1.38 for the clinical group and 1.52 for the community group. Results suggest that a linear combination of the ES and NCS scores render significant group differences, Λ (2, 59) = .31, $p < .001$. Classification accuracy was computed for each group separately and for the combined group.

Table 2.2

Means and Standard Deviations for CASP Scores, CELF-R Scores and SSRS Scores

	M (SD)	
Variable	Clinical Group	Community Group
CASP ES	29.53 (7.18)	51.31 (8.17)
CASP NCS	34.09 (14.07)	65.93 (14.39)
CELF-R Expressive	83.50 (14.77)	90.14 (12.25)
CELF-R Receptive	95.63 (17.05)	106.93 (14.96)
CELF-R Total	88.88 (15.87)	98.21 (12.99)
SSRS Parent	77.10 (11.59)	102.33 (13.48)
SSRS Teacher	84.33 (10.14)	105.77 (16.20)
SSRS Student	95.10 (13.02)	106.21 (15.60)

Note. All scores are standard scores with the exception of CASP scores.

Table 2.3

Classification Results for Discriminant Analysis of Participants using CASP ES and NCS

Actual Group	N	Predicted group membership	
		Clinical	Community
Clinical	32	31 96.9%	1 3.1%
Community	29	2 13.8%	27 86.2%

Note. Percentage of "grouped" cases correctly classified: 95.1%

Magill-Evans and colleagues (1995) have suggested that the strong correlation they reported between the ES and NCS ($r = .88$) may indicate that only one score is required. Interestingly, in this study the correlations between the ES and the NCS were $r = .79$. $p < .001$ (community group) and $r = .53$, $p < .01$ (clinical group). Although this difference is not statistically significant, this may provide support for the continued use of both scores in clinical assessment.

Means and standard deviations for language scores are presented in Table 2.2. Differences between groups on the expressive, receptive, and total language scores were examined, with alpha level set at .01. The community group scores were significantly higher than the clinical group scores on the CELF-R receptive scale, t (58) = 2.71, $p < .01$, but not significantly different on the CELF-R expressive scale, t (58) = 1.88, $p = .06$ or on the CELF-R total, t (58) = 2.47, $p = .02$.

The relationship between the CASP ES and NCS and expressive and receptive language (CELF-R), general social skills (SSRS), and problem behaviors (CBCL) was examined using Pearson correlations (see Table 2.4). Since the correlations for each group separately were not significantly different, the two groups were combined in order to determine the validity with both typically developing and clinical boys. As predicted, correlations between the ES of the CASP and standard scores on the teacher form of the SSRS were significant and moderate (range = .39-.63), as were the scores for the parent form, and the student form (range = .34-.52). Interestingly, correlations between parent, teacher and student forms on the SSRS were slightly higher than correlations reported for the SSRS normative sample. Lower correlations were found between scores on the ES and NCS and standard scores of expressive language, receptive language, and total language scores. As predicted, significant negative correlations were found between the ES score and the parent and teacher form t-scores for externalizing, internalizing, and total problem behaviors. Correlations between the NCS and other measures were similar in magnitude to the ES correlations. The relationship of IQ and CASP scores was also examined. Although the correlations were similar in magnitude to those reported in previous literature, the correlation did not achieve significance (ES: $r = .13$, NCS: $r = .16$).

Table 2.4

Intercorrelations Between Variables for the Combined Sample

Measure	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. CASP ES	--	.85[a]	.63[a]	.56[a]	.39[b]	.13	.31[c]	.25[c]	.30[c]	-.57[a]	-.43[b]	-.67[a]	-.49[a]	-.43[b]	-.60[a]
2. CASP NCS		--	.52[a]	.50[a]	.34[b]	.16	.29[c]	.28[c]	.28[c]	-.57[a]	-.38[b]	-.59[a]	-.56[a]	-.39[b]	-.54[a]
3. SSRS - Parent			--	.56[a]	.35[b]	.19	.38[b]	.34[c]	.40[b]	-.68[a]	-.67[a]	-.83[a]	-.58[a]	-.64[a]	-.69[a]
4. SSRS - Teacher				--	.43[b]	.10	.34[c]	.26	.30[c]	-.60[a]	-.47[a]	-.69[a]	-.66[a]	-.78[a]	-.83[a]
5. SSRS - Student					--	.17	.40[b]	.39[b]	.45[a]	-.40[b]	-.32[c]	-.43[b]	-.33[c]	-.31[c]	-.37[b]
6. WISC III Vocabulary Score						--	.59[a]	.59[a]	.63[a]	-.06	-.16	-.24	-.03	-.12	-.10
7. CELF-R Receptive.							--	.71[a]	.93[a]	-.31c	-.23	-.43[c]	-.25	-.20	-.30[c]
8. CELF-R Expressive								--	.92[a]	-.20	-.27[c]	-.39[b]	-.15	-.19	-.28[c]
9. CELF-R Total									--	-.29[c]	-.27	-.45[c]	-.21	-.21	-.31[c]
10. CBCL Internalizing - Parent										--	.64[a]	.82[a]	.69[a]	.50[a]	.63[a]
11. CBCL Externalizing - Parent											--	.75[a]	.43[b]	.64[a]	.61[a]
12. CBCL Total - Parent												--	.68[a]	.69[a]	.80[a]
13. CBCL Internalizing - Teacher													--	.62[a]	.80[a]
14. CBCL Externalizing - Teacher														--	.87[a]
15. CBCL Total - Teacher															--

[a] $p < .001$ [b] $p < .01$ [c] $p < .05$.

Discussion

The results of this study lend support to the CASP as a valid measure of social perception. The significant differences between the clinical and community groups on CASP scores suggests that the CASP can be used to determine the extent of differences between adolescent boys who have social perception deficits and boys without apparent social perception deficits. Thus it would be a useful clinical tool for examining individual differences in social perception.

Discriminant analysis using the CASP scores provides additional support for validity of the CASP. The CASP clearly identified the social perception deficits of the clinical population. Some of the community group were misclassified, suggesting that the CASP may be used to assist in determining the nature of social impairments in children but should not be used exclusively. Further assessment of the misclassified community boys was not done so it is not clear if they had some social perception deficits. The CASP's ability to discriminate between groups with less marked differences in social perception needs to be examined.

As further confirmation of the validity of the CASP, the CASP scores and general social skills scores were significantly correlated. This supports other evidence (e.g., Russell et al., 1993) of the relationship between social perception and general social competence. Correlations are moderate which suggests that the measures are addressing related but different constructs. Parent scores on the SSRS were the most strongly correlated with CASP scores. The student SSRS and CASP scores had the lowest correlations. The mean standard score for students is higher than the mean standard

scores of the parent and teacher forms suggesting that students rate themselves higher than their parents and teachers (see Table 2.2). Previous literature suggests that socially rejected children do not admit to having difficulties with their peers (Frankel, Cantwell, & Myatt, 1996). Because this potential source of rating bias is not present in the CASP, lower correlations with student scores are not surprising.

Lower significant correlations between CASP and language scores indicate that the CASP is not measuring just expressive and receptive language skills. Interestingly, language scores were correlated to general social skills in much the same way as they were to CASP scores (see Table 2.3), indicating a consistent level of relationship between language, social perception, and general social skills. These correlations are higher than those reported in the initial validation study of the CASP. This may be explained by the differences in measures as the CELF-R is a more complex measure of both receptive and expressive language while the measure used in the study by Magill-Evans and associates (1995) measured only expressive vocabulary. Using the social interaction model, the language skills of children who present with social perception deficits should be considered, as it seems reasonable to expect that the verbal and nonverbal components of social interaction would be related. The relationship between social perception and language skills needs further study and caution must be used in interpreting low CASP scores in a child who also scores poorly on a standardized expressive and receptive language assessment.

It may also be important to look at the relationship of pragmatic language skills and CASP scores in future studies. The CELF-R does not purport to measure the kind of

pragmatic language skills which seem to be more theoretically linked to social perception such as the ability to make inferences and to appropriately initiate and sustain conversations with others. Pragmatics may be more closely related to social perception than receptive and expressive language skills. Prutting and Kirchner (1987) describe a pragmatic language protocol which includes nonverbal, paralinguistic and verbal parameters. The nonverbal parameters include aspects of communication such as physical proximity, gestures, facial expressions, and eye gaze. The relationship between the ability to use nonverbal aspects of language and the ability to interpret nonverbal aspects of language in others has not been examined, but one would expect that they would be significantly correlated.

The significant negative correlations between CASP scores and internalizing and externalizing problem behaviors were anticipated. This study supports findings by Russell et al. (1993) and Walker and Leister (1994) which suggest that externalizing and internalizing problem behaviors are related to social perception. This finding is also consistent with the social interaction model (Doble & Magill-Evans, 1992) which proposes that factors such as affective processes, interaction style, and problem-solving ability will all impact on the ability to read and interpret social cues. Children who present with externalizing problem behaviors such as aggression may have difficulty recognizing and interpreting social cues. They may be misinterpreting cues as threatening and responding with aggression. The affective state of children with internalizing problem behaviors such as anxiety and withdrawal may affect how some cues are

interpreted. Conversely, they may be having difficulty interpreting cues and become anxious because they don't understand the social world.

The study has some methodological limitations. Further research using more than an estimate of IQ may provide more complete information about the relationship of IQ and social perception as measured by the CASP. Caution must be used in making generalizations beyond the specific age group of this study. Studies examining the validity of the CASP with younger children, children with other diagnoses, and with girls are necessary. Evidence of the relationship between social perception and observational measures of social competence are needed. Finally, additional research might address the concurrent validity of the CASP by examining the relationship of CASP scores to measures using the single channel approach.

The CASP was developed to measure social perception within a model of social interaction that attempts to account for the complexity of how individuals interact. Validity has been demonstrated through findings of predicted relationships between CASP scores and scores on measures of constructs thought to be related to social perception such as general social skills, language, and problem behaviors. The finding of strong differences between groups with differing social abilities on CASP scores also support its construct validity. While more work is required, it would appear that researchers and clinicians can use the CASP to examine the social perception abilities of children.

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Chapter 3

Social and Language Skills in Adolescent Boys with Asperger's Disorder

Introduction

The social interaction deficits of the individual with Asperger's Disorder (AD) are well recognized. Criteria used to diagnose AD suggest that the individual with AD experiences a qualitative impairment in social interaction (American Psychiatric Association [APA], 1994; Gillberg & Gillberg, 1989; Szatmari, Bremner, & Nagy, 1989; Tantam, 1988; World Health Organization [WHO], 1990). This qualitative impairment is defined to include socially and emotionally inappropriate behavior (Gillberg & Gillberg), lack of appreciation for social cues (Gillberg & Gillberg; Wing, 1981), inability to interact with peers or to develop peer relationships (APA; Gillberg & Gillberg), and an impairment in the ability to use nonverbal behaviors to regulate social interaction (APA).

Children with AD have been described as having impairments which include difficulty comprehending others' facial expressions and a poor understanding of the rules governing social interaction (Wing, 1981); difficulty sensing the feelings of others (Szatmari et al., 1989); failure to make adjustments to fit different social contexts or the needs of different listeners (Tantam, 1988); and failure to use eye-to-eye gaze, facial expression, body posture, and gesture to regulate social interaction (WHO, 1990). The type of social output impairments which have been described include a lack of socio-emotional reciprocity (WHO); marked impairments of nonverbal expressiveness which affect voice, facial expression, gesture, gaze, and posture (Tantam); and speech and language peculiarities (Gillberg & Gillberg, 1989). More general descriptions of social

interaction deficits include a failure to develop age-appropriate peer interactions (APA; WHO). A case study of an adolescent boy with AD suggested that social perception or the ability to infer the affective state of others based on nonverbal social cues (e.g., facial expression, gesture, tone of voice, situational cues) needs to be addressed when evaluating the social interaction deficits of AD (Koning, Manyk, Magill-Evans, & Cameron-Sadava, 1997).

Despite the prominence of social impairments in the diagnosis of AD, few studies have measured social interaction in individuals with AD using reliable and valid measures. A pilot study by Scott (1985) which examined vocal and facial recognition and production using a nonstandardized measure found that participants with AD did not do as well as non-AD participants and staff controls on facial recognition and vocal production and recognition. Ellis and colleagues (Ellis, Ellis, Fraser, & Deb, 1994) examined the ability of individuals with AD to make hypothetical social judgments. Although they reported that scoring of the situations used to evaluate social judgment was somewhat arbitrary, the 7 subjects with AD made a higher proportion of errors compared to 36 adolescents and young adults. Davies and colleagues (Davies, Bishop, Manstead, & Tantam, 1994) investigated the ability of children with AD to identify emotion from facial expressions, a component of social perception. Their results showed that children with AD scored significantly worse than controls. As part of extensive testing, Burgoine and Wing (1983) assessed a set of triplets with AD using the Vineland social quotient and found all three subjects to be in the severely impaired range. A more recent study using the Vineland Adaptive Behavior Scales (Sparrow, Balla, & Cicchetti, 1984) found that

children with AD scored well below normal on socialization (Szatmari, Archer, Fisman, Streiner, & Wilson, 1995).

Social-cognitive deficits have been more precisely measured by Fein and colleagues (Fein, Lucci, Braverman, & Waterhouse, 1992) in a population of children with pervasive developmental disorders (PDD). They raise several issues which need to be emphasized. Fein and colleagues suggest that social cognitive tasks which require the child to understand the context in which a given emotion is appropriate would more accurately reflect "real-life functional deficits." They also suggest that the control group should be selected based on verbal tasks, rather than nonverbal tasks as matching on nonverbal tasks serves to overestimate the IQ of individuals with PDD such as Asperger's Disorder, increasing the likelihood of finding differences. They compared 15 children to a control group matched on verbal IQ and a control group matched on nonverbal IQ and found no significant differences among the three groups on context-affect matching tasks. The proportion of subjects with PDD who scored poorly on the social cognition task, however, was greater than the proportion of controls matched on nonverbal IQ, but not greater than the proportion matched on verbal IQ.

Language deficits, in contrast to social interaction deficits, have not been well defined in the AD literature. Although diagnostic criteria suggest that there is no significant general delay in language development (e.g., APA, 1994; WHO, 1990), many researchers have suggested that children with AD present with odd speech including the idiosyncratic use of words (e.g., Szatmari et al., 1989; Wing, 1981), poor speech prosody (e.g.,Wing, 1981), and semantic and pragmatic language abnormalities (e.g., Bishop,

1989; Tantam, 1991). Few studies have measured the receptive and expressive language abilities of the child with AD. Szatmari and colleagues (1995) described a sample of children with AD and reported that they fell within 1 standard deviation below the mean on measures of expressive and receptive language. Differences between expressive and receptive language skills within the AD group were not reported.

To further understand the specific nature of the deficits of adolescents with AD, the first objective of this study was to provide standardized measurement of the social interaction deficits of adolescent boys with AD by comparing them to age, gender and IQ matched controls. We were particularly interested in measuring the social perception and general social skills of individuals with AD. The ability to make inferences from social cues such as facial expression, gesture, tone of voice, and situational references seems to be a critical deficit in this population. Measurement of general social skills was done using a multi-rater approach to include the perspectives of the parent, teacher and student. The second objective of this study was to provide data on the expressive and receptive language abilities of adolescents boys with AD and to discuss the relationship of language abilities to the social interaction skills of the adolescent with AD.

Method

Clinical and Community Participants

Twenty-one boys aged 12 - 15 years (M = 14.05, SD = 1.16) who met the Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition (DSM-IV) (APA, 1994) criteria for AD comprised the group with AD for this study. Participants were drawn from a larger sample (N = 31) recruited for a validation study of the Child and

Adolescent Social Perception measure (CASP) (Koning & Magill-Evans, 1997). Girls were excluded because we did not want to confound results with gender issues on some of the measures used and because the diagnosis of AD is much more common in boys than girls (Ehlers & Gillberg, 1993).

Referring psychiatrists were asked to refer adolescent boys who met the DSM-IV criteria for Asperger's Disorder. The participants included all the boys who met the inclusion and exclusion criteria (i.e., age, gender, diagnosis, IQ) during the three year period of this study. Psychiatrists also completed a screening questionnaire, developed as part of an epidemiological study of AD, for each participant. The Asperger's Syndrome Screening Questionnaire (ASSQ) (Ehlers & Gillberg, 1993) lists 27 characteristics commonly seen in children with AD. The participant is rated on each characteristic using a scale of 0 (indicating normality) to 2 (indicating abnormality). Higher scores (maximum 54) indicate that the child exhibits characteristics which more closely match the diagnosis of AD. The more definitive characteristics of AD have an asterisk or double asterisk, indicating items which were considered most specific to AD. Ehlers and Gillberg report that the test-retest reliability for total scores, over an 8 month period, was .90 and inter-rater reliability was .79. The five children who were definitely considered to have AD after extensive neuropsychiatric examination in the epidemiological study by Ehlers and Gillberg (1993) had ASSQ scores of 35, 32, 30, 25, and 9 as rated by their teacher. Ellis and colleagues (1994) also confirmed the diagnosis of AD using the ASSQ in their study. They reported a range of scores of 33 to 48 for 7 subjects with AD. Unpublished data from a clinical study by Ehlers (as cited in Gillberg, Nordin, & Ehlers,

1996) indicates that the best cut-off score for identification of AD is 13 when parents are completing the questionnaire and 22 when teachers are completing the questionnaire.

The range of ASSQ scores for participants in this study who met the DSM-IV criteria for AD was 31 to 51, with a mean of 37.1 and a standard deviation of 5.1. All the participants in our study scored at least 10 points on the 8 ASSQ items considered most specific to AD (median = 14; total possible score = 16). Boys who did not meet the DSM-IV criteria for AD or presented with a comorbid diagnosis such as attention-deficit disorder were excluded. All of the boys included in the AD group had histories of normal language development and had never been previously diagnosed with autism. Two of the boys also had a diagnosis of Tourette's Disorder. The co-occurence of these two disorders has been described (e.g., Kerbeshian & Burd, 1986; Marriage, Miles, Stokes, & Davies, 1993). Although there are significant implications related to etiology and treatment for the diagnosis of Tourette's Disorder, the implications for assessment of social skills seemed minimal and did not preclude their participation in the study.

Twenty-one boys who matched the clinical participants on age ($\underline{M}$ = 13.82, $\underline{SD}$ = .67) and an estimate of IQ were selected from the community group for the larger CASP validation sample. They were recruited from local schools for inclusion in the comparison group. The vocabulary subtest of the Weschler Intelligence Scale for Children - Third edition (WISC III) (Weschler, 1991) was used as an estimate of IQ as this subtest correlates strongly with full scale scores ($\underline{r}$ = .79 - .85) and with verbal IQ ($\underline{r}$ = .88 - .89) for this age group. Teachers were asked to refer students who did not speak English as a second language and did not have social skill or peer relationship difficulties.

The AD and comparison group did not differ on age, vocabulary subtest scores, and socioeconomic status as measured using the Socioeconomic Index for Occupations in Canada (Blishen, Carroll, & Moore, 1987) (see Table 3.1).

Table 3.1

Means and Standard Deviations for Matching Variables

	M (SD)	
Variable	AD Group	Comparison Group
Age (years)	14.04 (1.19)	13.82 (.67)
WISC III Vocabulary Score (standard score)[a]	10.24 (3.29)	10.76 (2.41)
Socioeconomic Index (Father)	40.20 (19.40)	41.98 (16.52)

[a]standard score mean = 10

Measures

The Child and Adolescent Social Perception measure (CASP) (Magill-Evans, Koning, Cameron-Sadava, & Manyk, 1995) is a standardized, individually administered test designed to assess social perception in children ages 6 to 15 years. It consists of 10 short unrelated videotaped scenes which depict children and adolescents in typical social interactions. The scenes have been audio filtered (making the individual words unintelligible, but retaining the vocal tone and prosodic features) so that meaning must be derived from nonverbal and situational cues. After each scene the child describes what happened in the scene, how each of the characters was feeling (emotion recognition and labeling), and how they knew the character was feeling that way (reporting of nonverbal

cues used to infer the emotion). The answers are checked against a key and the child receives two scores: the Emotion Score (ES), which reflects the child's ability to identify the emotions portrayed in the scene, and the Nonverbal Cues Score (NCS), which reflects the child's ability to identify the types of cues used to infer emotions. The types of cues are broken down into any reference to facial cues (facial expression, how their face looked), body cues (gestures, body movements), situational cues (aspects of the situation such as a birthday gift that may have contributed to understanding how the person was feeling), and voice cues (tone of voice, how something was said).

Validity has been demonstrated by findings indicating significant effects of age with older children scoring higher than younger children (Magill-Evans et al., 1995), differences between diagnostic groups (Magill-Evans, Koning, Manyk, & Cameron-Sadava, 1996), and differences between adolescents referred with social perception deficits compared to matched controls (Koning & Magill-Evans, 1997). Internal consistency coefficients, test-retest reliability and inter-rater reliability are all above .80.

The Social Skills Rating System (SSRS) (Gresham & Elliot, 1990) is designed to evaluate social skills such as empathy, self-control, cooperation, and assertiveness. The parent, teacher, and student complete questionnaires which rate specific skills on a scale of 0 to 2 with higher scores indicating greater competence. This multi-rater approach provides several perspectives on the student's general social skills. Standard scores on the SSRS have a mean of 100 and a standard deviation of 15. Correlations were .33 (teacher with parent), .36 (parent with student), and .41 (teacher with student) in the normative study. Gresham and Elliot report internal consistency coefficients ranging from .84 to .95.

Test-retest reliability for the total scores was .85 for the teacher form, .87 for the parent form, and .67 for the student form.

The Social Competence Scale (SCS) of the Child Behavior Checklist (CBCL) (Achenbach, 1991) is part of the parent form of the CBCL. Scores are derived from questions about the organized activities the child is involved in, the number of friends and frequency of contact, behavior with others, and how well the child works or plays by him/herself. Of interest in this study is the number of friends, frequency of contact with friends and behavior with others.

The Clinical Evaluation of Language Fundamentals-Revised (CELF-R) (Semel, Wiig, & Secord, 1987) is designed to provide a standardized measure of expressive and receptive language. Receptive language subtests include oral directions, word classes, and semantic relationships. Expressive language subtests include formulated sentences, recalling sentences and sentence assembly. Scaled score means equal 100 with a standard deviation of 15. The manual reports that test-retest reliability was .63 (receptive), .79 (expressive), and .77 (total language score). Inter-rater reliability scores for individual subtests ranged from .82 to .99.

Procedures

Clinical participants were referred by psychiatrists who confirmed the DSM-IV diagnosis of AD through interviews with parents and participants, chart reviews, and by completing the ASSQ (Ehlers & Gillberg, 1993). Participants were tested in a location convenient for them. Informed consent was obtained from the parent and the participant. Each participant completed the CASP, which was administered by research assistants

who had achieved inter-rater reliability of .80 or greater. The student form of the SSRS was completed by participants after the CASP was administered. A parent completed the SSRS parent form and the social competence scale as part of completing the parent form of the CBCL. Participants were asked to identify a teacher who knew them well. This teacher completed the teacher form of the SSRS. Individual language testing was carried out by an experienced speech-language pathologist.

Results

Means and standard deviations for all CASP variables are presented in Table 3.2. A multivariate comparison of CASP variables including ES, and number of facial, body, situational, and voice cues reported revealed significant differences between groups, F (5, 36) = 22.42, $p < .001$. Posthoc tests indicated that there were significant differences between groups on all scores except total facial cues (see Table 3.2).

Table 3.2

Means, Standard Deviations and Post Hoc Tests for CASP and SSRS total scores

Variable	M(SD)		t	95% Confidence Band[a]	
	clinical	community		Lower	Upper
CASP ES	31.52 (6.09)	51.95 (8.36)	-9.05*	-26.53	-14.32
CASP NCS[b]	36.19 (14.83)	64.47 (15.12)			
Body Cues	8.86 (5.67)	22.57 (6.67)	-7.19*	-18.88	-8.55
Facial Cues	16.67 (5.52)	19.19 (6.92)	-1.31	-7.75	2.70
Situational Cues	5.24 (4.32)	11.57 (5.09)	-4.34*	-10.28	-2.39
Voice Cues	5.48 (3.74)	11.38 (4.74)	-4.48*	-9.47	-2.34
SSRS - parent	79.33 (12.71)	102.86 (13.68)	-5.78*	-33.71	-13.34
SSRS - teacher	85.67 (10.59)	110.57 (12.64)	-6.92*	-33.89	-15.92
SSRS - student	95.52 (13.00)	108.91 (10.33)	-3.56*	-22.76	-3.40

Note. Results are significant when confidence bands do not span zero.

[a] multivariate Bonferronni confidence intervals are reported.

[b] CASP NCS scores were not entered into the MANOVA due to colinearity.

* $p < .05$, two-tailed.

Participants with AD referred most frequently to facial cues, while the comparison group referred most frequently to body cues for inferring emotions. To determine the relative proportion of cues in each category for each group, the percentage of the total cues reported in the body, facial, situational, and voice cues categories were examined (see Table 3.3). Univariate F - tests revealed significant differences in the percentages of facial and body cues used by the AD group and the comparison group. Significant differences were not found for the percentages of situational and voice cues used between groups. Table 3.4 presents the number of participants in each group who scored above and below the normative mean for their age group on the ES and NCS.

Table 3.3

Means, Standard Deviations and Univariate F Tests for Percentages of Nonverbal Cues

	M (SD)		F[a]
Variable	AD Group	Comparison Group	
Body	23.55 (10.64)	35.30 (8.79)	15.22*
Facial	49.30 (15.09)	29.69 (7.87)	27.90*
Situational	12.63 (7.01)	17.87 (8.46)	4.78
Voice	14.52 (6.58)	17.15 (5.30)	2.03

[a] df for F tests are (1, 40).
* $p < .01$.

Table 3.4

Frequencies of CASP ES and NCS Scores: Above and Below the Mean

Variable	AD Group	Comparison Group
CASP ES		
Above mean	0	14
Within 1 SD below the mean	2	5
More than 1 SD below mean	19	2
CASP NCS		
Above mean	2	14
Within 1 SD below the mean	4	5
More than 1 SD below mean	15	2

A multivariate analysis of variance (MANOVA) between groups using the SSRS parent, teacher, and student total standard scores also revealed significant differences, F (3, 38) = 23.83, $p < .001$. Post hoc tests using joint multivariate .95 Bonferroni confidence intervals supported differences between groups for all 3 raters (see Table 3.2). As individual subtests might explain differences between groups these were also examined using a MANOVA. Significant differences were found between groups, F (19, 31) = 16.31, $p < .001$. Means and standard deviations for SSRS subtest scores are presented in Table 3.5. Post hoc tests revealed significant differences between groups on parent scores of assertion and self control, teacher scores of assertion, cooperation, and self control, and student scores of assertion (see Table 3.6).

Table 3.5

Means and Standard Deviations for SSRS Subtest Scores and CELF-R Language Scores

	M (SD)	
Variable	Clinical	Community
SSRS - parent		
Assertion	7.95 (3.19)	14.52 (2.40)
Co-operation	9.00 (3.61)	11.76 (3.39)
Self Control	9.19 (3.74)	13.62 (3.89)
SSRS - teacher		
Assertion	7.52 (2.87)	12.52 (3.98)
Co-operation	12.19 (4.20)	17.24 (3.00)
Self Control	10.00 (3.08)	15.67 (4.43)
SSRS - student		
Assertion	8.48 (3.52)	13.52 (2.46)
Co-operation	12.95 (2.65)	14.81 (2.68)
Self Control	11.67 (3.60)	11.57 (2.73)
Empathy	13.00 (3.81)	14.43 (2.44)
CELF-R		
Expressive	82.30 (15.99)	91.80 (10.64)
Receptive	94.10 (17.17)	110.85 (14.46)

Note. There are no standard scores for subtests on the SSRS.

Table 3.6

Post Hoc Tests for SSRS Subtest Scores and CELF-R Language Scores

Variable	t	95% Confidence Band[a]	
		Lower	Upper
SSRS - parent			
Assertion	-7.55*	-9.16	-3.40
Co-operation	-2.56	-5.97	.45
Self Control	-3.76*	-7.93	-.93
SSRS - teacher			
Assertion	-4.67*	-8.19	-1.82
Co-operation	-4.48*	-8.40	-1.70
Self Control	-4.81*	-9.17	-2.17
SSRS - student			
Assertion	-5.39*	-7.83	-2.27
Co-operation	-2.26	-4.30	.59
Self Control	.10	-2.83	3.02
Empathy	-1.45	-4.36	1.50
CELF-R			
Expressive	-2.21	-19.52	.52
Receptive	-3.39*	-29.04	-5.35

Note. Results are significant when confidence bands do not span zero.
[a] multivariate Bonferronni confidence intervals are reported.
* $p < .05$, two-tailed.

Table 3.7 presents frequencies of number of friends for each group as reported by parents on the CBCL. A MANOVA was done for number of friends, frequency of contact with friends, and social competence scores. Significant differences between groups were found, $F(1, 40) = 39.41$, $p < .001$. Table 3.8 presents univariate F tests for the social variables on the CBCL. Significant differences were found for number of friends, frequency of contact and social competence, $p < .001$.

Table 3.7

Frequencies of Number of Close Friends

Variable	AD Group	Comparison Group
Number of Close Friends		
0 friends	9	1
1 friend	7	1
2-3 friends	2	8
4 or more friends	2	11
Total	20[a]	21

[a]one parent did not report number of close friends

Table 3.8

Means, Standard Deviations and Univariate F tests for Scores on CBCL Social Variables

	M(SD)		F[a]
Variable	AD Group	Comparison Group	
Number of Friends	.25 (.55)	1.42 (.69)	39.81*
Frequency of Contact	.55 (.69)	1.68 (.48)	31.12*
Social Competence	.80 (1.15)	3.11 (1.05)	43.23*

[a] df for F tests are (1,40).
* $p < .001$.

A MANOVA was performed to determine whether the groups were significantly different on receptive language scores and expressive language scores. Results indicate significant differences between groups, F (3, 36) = 4.41, $p < .01$. Post hoc tests revealed significant differences between groups on receptive scores, t (40) = 3.39, $p < .01$, but not expressive language scores, t (40) = 2.21, $p = .03$. Means, standard deviations and Bonferroni confidence intervals for receptive and expressive language scores are presented in Table 3.6. Significant differences were not found between receptive and expressive language in the AD group although both groups had higher receptive language scores, t (40) = 3.62, $p < .01$. Means and standard deviations for the CELF-R subtests are presented in Appendix B. Table 3.9 presents the range of scores for each group.

Table 3.9

Frequencies of CELF-R Expressive and Receptive Language Scores

Variable	Clinical Group	Community Group
CELF-R Expressive Language Score		
Above mean	3	6
Within 1 SD below mean	3	8
More than 1 SD below mean	14	6
CELF-R Receptive Language Score		
Above mean	9	14
Within 1 SD below mean	5	6
More than 1 SD below mean	7	0

Discussion

The results from this study indicate that adolescent boys with AD have significant deficits in social perception and general social skills. Group differences in social perception scores were large, suggesting that social perception is indeed a core deficit in this population. Because the video scenarios portrayed in the CASP were intended to portray situations children and adolescents might commonly encounter and the cues are presented simultaneously, the participants were required to make judgments about the emotions of the characters in a manner somewhat similar to everyday social interactions. This may explain why the adolescents with AD in this study scored so poorly, compared to the participants in the study described by Fein and colleagues (Fein et al., 1992).

Adolescents with AD seem to have greater difficulty dealing with the simultaneous presentation of facial, voice, body, and situational or contextual cues. They may have less difficulty inferring the affective state of others based on the task of labeling still photographs or matching contextual and facial expressions. Overall, they reported using fewer cues. Adolescents with AD relied most frequently on facial and body cues to infer emotion, cues which are also used most frequently by the community group. However, when results are expressed as a proportion of total cues, the AD group used facial cues proportionately more and body cues proportionately less than the community group. As total nonverbal cues scores were much lower for the AD group, these results suggest that they may be too focused on facial and body cues and may not be attending to all the relevant cues in social interactions. Because the verbal content has been filtered out of the CASP, it is not clear if they rely strongly on verbal content, which was not available here. Their relative reliance on verbal content needs to be examined in future studies.

Significant differences between groups with AD and matched groups support the descriptive literature on Asperger's Disorder and corroborate some of the earlier findings in studies measuring components of social perception and general social skills. Many of the characteristics listed in diagnostic criteria for AD are related to social perception including difficulty sensing the feelings of others (Szatmari et al., 1989), lack of appreciation for social cues (Gillberg & Gillberg, 1989), lack of social or emotional reciprocity (APA, 1994; WHO, 1990), and failure to make adjustments to fit different social contexts (Tantam, 1988). The relationship of social perception to other social interaction deficits such as the failure to use nonverbal communication (APA; Gillberg &

Gillberg; Tantam, Holmes, & Cordess, 1993; WHO) also needs to be systematically measured in this population.

The significant differences between groups on measures of general social skills supports previous descriptive literature and diagnostic criteria. These differences persisted across most subtests and across all raters. The difference between groups in terms of participant ratings is most interesting as it suggests that adolescent boys with AD are aware of some of the deficits they are experiencing, particularly in the area of assertion. The assertion subscale includes initiating behaviors such as asking for information, responding to the actions of others, and meeting new people. Adolescents with AD seem to recognize some of the deficits they are experiencing in this area. Wing (1992) has suggested that awareness of their social deficits may predispose them to depression. The ratings that the boys with AD made of their own skills suggest that clinicians need to be sensitive to the possibility of depression for this population of adolescents. Intervention programs focusing on improving their ability to initiate interactions and get assistance or information in a socially appropriate manner may be required for adolescents with AD.

Sixteen of the adolescent boys with AD reported having no friends or only 1 friend. The prospects for developing social skills without social interaction with peers would seem to be poor. Deficits in social perception and general social skills in adolescent boys with AD are confounded by the lack of opportunity to interact and the lack of experience interacting with peers. The implications of this for adolescents with AD are complex and at least partially dependent on their desire for friendship. Research

examining the roles of motivation, opportunity to interact, and experience as contributing factors to social perception and general social skills is necessary.

The significant differences between groups on receptive language and the number of participants with AD who scored more than 1 SD below the mean on receptive and expressive language indicates that adolescents with AD may have subtle language impairments. These results need to be interpreted with caution because the community group scored above the normative mean for the receptive language score. Adolescents with AD seem to have difficulties receiving and interpreting both verbal and nonverbal language, relative to the community group. However, their mean receptive language score is well within the normal range, unlike their mean score on expressive language. The expressive language scores of the community group are also lower than the test means reported in the manual which resulted in nonsignificant differences between groups. Whether this is a result of actual lower expressive language scores or related to measurement using the CELF-R is not clear.

Hobson (1992) suggests that there are two points of controversy which need to be addressed when examining results of emotion recognition studies in children with high functioning autism which are also relevant in examining results of emotion recognition in AD. The first issue is related to whether the deficit in recognizing emotion is a function of language deficits. While this issue has not been completely resolved by the results of this study, expressive language scores were not significantly different between groups. The second issue is related to how participants are matched. This issue has been addressed by matching on an IQ subtest which is highly correlated to verbal IQ. The issue

of whether other cognitive deficits affect social perception in AD remains unresolved. Impairments in social attentiveness, motivation, and problem-solving abilities may play a role in social perception abilities in children with AD.

Identification of specific social interaction deficits may allow clinicians to target intervention goals and strategies. Strategies aimed at teaching the child with AD social perception skills have already been suggested (Klin & Volkmar, 1996; Williams, 1995). The CASP may be valuable in monitoring improvements in social perception in children and adolescents with AD (Koning et al., 1997). Alternatively, the environment may be altered to compensate for specific social deficits identified in assessment (Klin & Volkmar; Williams). This may be particularly true in the school environment where a more structured, success-oriented approach to peer interaction can be organized to accommodate social perception deficits.

This study has some limitations. Generalizability is limited by the age and gender of the participants who were assessed in this study. Gender is a particularly important issue, because it is linked to both prevalence of AD and to social perception. A larger sample would be helpful for establishing within group correlations. Research must focus on delineating the pragmatic language skills of individuals with AD and the relationship of these to social skills. Theoretical issues such as opportunity to interact and motivation to make friends were not addressed in this study. The relationship between social opportunities, motivation or desire for friendship, and general social skills in children and adolescents with AD should be examined.

In summary, this study has provided standardized assessment of social and language skills in adolescent boys with Asperger's Disorder. Because measurement of social perception in this study focused on the ability to read social cues presented simultaneously and ratings of general social skills using a multi-rater approach, we now have a clearer picture of how well adolescents with AD do in real-life social interactions. Delineation of the social and language deficits in AD will allow clinicians to target intervention. Future research must focus on whether intervention focused on improving social deficits is effective for children with AD.

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Chapter 4

Conclusion

Children's social interaction skills have received increased attention due to evidence of a predictive relationship between poor peer relationships and poor adjustment in adulthood (Parker & Asher, 1987). Little research has examined the competencies underlying social interaction skill in children using reliable and valid measures. Using the model of social interaction proposed by Doble and Magill-Evans (1992) (see Figure 1.1) as a guide for conceptualizing social interaction, researchers and clinicians may examine the role of various components of social interaction. One of the underlying skills for social interaction is the ability to accurately perceive and interpret nonverbal social cues.

The CASP (Magill-Evans, Koning, Cameron-Sadava, & Manyk, 1995) was intended to provide clinicians with a standardized assessment of the child or adolescent's ability to perceive and interpret nonverbal social cues. Valid measurement of the construct of social perception is important for several reasons. First, social perception has been identified as a deficit in many populations of children referred for special services, including children with learning disabilities (Semrud-Clikemand & Hynd, 1993), and children with psychopathology (Russell, Stokes, Jones, Czogalik, & Rohleder, 1993). Secondly, social perception has been found to be correlated to general social competence (Custrini & Feldman, 1989), and popularity (Boyatzis & Satyaprasad, 1994). Finally, considerable research has focused on the developmental nature of social perception (e.g., McAlpine, Singh, & Kendall, 1991, Phillipot & Feldman, 1990), suggesting that as children get older, their social perception increases.

Despite the recognition that social perception plays a critical role in the development of social interaction skills, methodological, conceptual, and developmental issues were not adequately addressed by measures available prior to the development of the CASP. In addition, few studies have measured social perception based on theoretical models which include the context of social cues and the nature of how cues are presented in real life. Previous measurement of social perception has relied on measures which provide little standardization and validity information or are limited to narrow age groups. The CASP has attempted to address the methodological and conceptual issues within a developmental framework. The initial standardization and validation of the CASP did not examine two areas of construct validity. Validation of the CASP has been addressed by findings of clear differences between groups and anticipated relationships between social perception and measures of constructs thought to be related to social perception. The use of the CASP to examine social perception abilities in a population of adolescents with AD provides further insight into the nature of social perception deficits in this population.

Taken together, the research presented in the previous two chapters provides clear support for the use of the CASP in measuring individual differences in social perception. The relationship between social perception and social output skills has been demonstrated in positive correlations between CASP scores and parent, teacher, and student ratings of general social skills. The low but significant correlations with language scores suggest that the adolescent's ability to perceive and interpret nonverbally is related to the ability to receive, interpret and express verbally. The relationship of CASP scores and

externalizing and internalizing problem behaviors suggest that social perception may play a role in how adolescents cope with social interaction difficulties.

Evidence of measurable impairments in social perception in specific populations of children may be used to guide both diagnosis and treatment. While this research does not suggest that social perception deficits are a distinguishing criteria for the diagnosis of Asperger's Disorder, it does support the descriptive diagnostic criteria currently in use in child and adolescent psychiatry (American Psychiatric Association, 1994; World Health Organization, 1990). Identification of specific social interaction deficits allows for focused intervention, particularly in the area of social perception.

Because social interaction is a complex behavior, there may be many etiological sources for social skill dysfunction. The model of social interaction proposed by Doble and Magill-Evans (1992) suggests that social perception is only one area where there may be a "breakdown." The impact of other variables (see Figure 1.1) has not been systematically controlled for in this research, nor has it been controlled for in previous research examining various aspects of social perception. Further work examining the role of variables such as auditory processing, volition, and the type of feedback received may provide further insight.

Valid measurement of social perception will make possible studies examining the role of social perception in general social interaction deficits of specific populations of children; whether social perception deficits can be successfully remediated; and the relationship of social perception to cognitive and language skills. The validation of the CASP allows clinicians who assess and treat social interaction deficits to assess the

construct of social perception using a measure which examines how well the child can perceive and interpret nonverbal social cues presented in a manner similar to how cues are presented in everyday interactions.

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Appendix A: Information Sheet and Consent Forms

On Glenrose Rehabilitation Hospital letterhead

Volunteer Recruitment Information Sheet

Dear Parent/ Guardian:

We are interested in various aspects of social skills. We have recently developed a measure to determine the ability of children between the ages of 6-15 years to understand nonverbal cues. These cues include facial expressions, tone of voice, body posture, and situational information. This measure is called the Child and Adolescent Social Perception Measure. It is a videotape which has 10 unrelated scenes showing kids in typical everyday situations. We have tested children in Edmonton schools with this test. We are now planning to look at how well this measure tests what it is supposed to test. We also want to know how similar or different it is from other tests which might measure some of the same things.

To do this, we would like volunteers who are boys between the ages of 12 and 15 years of age. Initial testing will consist of a vocabulary test which will take about 10 minutes. This test will determine if your child meets the needs of the study. Other testing will require two 1 hour blocks of time. We would like your permission to look at your child's school records to see if your child meets the needs of the study. Testing will take place at a convenient time for your child.

You will also be asked to complete two questionnaires about your child's behavior. A similar questionnaire will be given to your child's teacher to complete.

Confidentiality will be respected. Involvement in the project is voluntary. If you are willing to have your child participate, please complete the attached consent form and return it to_____by _____. Thank-you.

_____

Cyndie Koning
Occupational Therapist
Glenrose Rehabilitation Hospital
471-7902

on Glenrose Rehabilitation Hospital letterhead

Parents'/Guardians' Consent Form

Project Title: Validation study of the Child and Adolescent Social Perception Measure

Investigators: Cyndie Koning, BSc OT, Glenrose Rehabilitation Hospital 471-7902
Joyce Magill-Evans, Phi D, Department of Occupational Therapy, University of Alberta 492-0402

I,_____, agree to allow my child to participate in this project. The Child and Adolescent Social Perception Measure is used to look at how well children pick up on nonverbal social cues. This project will help to determine if this measure is measuring what it is supposed to measure.

I agree to allow the investigators to review my child's school record to determine if my child meets the needs of the study. I also agree to allow my child to complete a vocabulary test to determine if my child meets the needs of the study. If my child participates in the study he will complete tests of social perception, general social skills, and expressive and receptive language. The vocabulary testing will require approximately 10 minutes. Other testing will require two 1 hour blocks of time. Testing will take place at a time which is convenient for my child.

I also agree to complete two questionnaires. They will ask me questions about my child's behavior. This will take 20-30 minutes of my time. My child's teacher will also be asked to complete a similar questionnaire about my child's behavior.

There are no risks involved. Participation is voluntary. I or my child can decide to stop at any time. This will not affect any services from the Glenrose Rehabilitation Hospital or the University of Alberta.

The information will be kept confidential. No names will ever appear; just an age and a number. Testing results will be kept only under this number so that there is no way to identify the name of the child parent, or teacher. Once the results of the study have been published all of the testing results will be destroyed.

The purpose of this study has been explained to me and all my questions have been answered satisfactorily. I understand that I will be given a copy of this form. If I have any questions, I can

call the people listed on this form for answers. I understand that my signature on this form means that I agree to allow my child to participate.

_____	_____	_____
Signature of parent/guardian	relationship to the child	date

_____	_____
Signature of researcher	date

Note: The location and timing of testing will be indicated on the consent form when arrangements are final.

on Glenrose Rehabilitation Hospital letterhead

Teen's Consent Form

Project Title: Validation study of the Child and Adolescent Social Perception Measure

Investigators: Cyndie Koning, BSc OT, Glenrose Rehabilitation Hospital 471-7902
Joyce Magill-Evans, Ph D, Department of Occupational Therapy, University of Alberta 492-0402

I,_____, am _____ years old.

I agree to be part of this study. The study is about how different people score on a test which measures how people can tell what other people are feeling just by watching them. I will also be asked to complete a few different tests. Sometimes the tester will ask me questions and sometimes I will be asked to write down answers. My answers will be used to compare different scores. I will first complete a short test to see if I mmet the needs of the study. This will take about 10 minutes. After that, I may be asked to come for two more 1 hour sessions.

Only the people working on this study will see the answers that I give. No one is making me do this. I know that if I do not like it I can stop at any time. I have asked all the questions I had about the study.

If I have any more questions I can ask my parents or the people listed at the top of this sheet.

_____ _____

signature of teen date

_____ _____

signature of researcher date

Appendix B: Means and Standard Deviations for CELF-R Subtest Scores

	M	
Variable	AD	Community
Receptive Subtests		
oral directions	8.05 (3.31)	11.00 (2.51)
word classes	10.05 (3.50)	12.65 (2.52)
semantic relationships	9.86 (3.21)	11.30 (2.74)
Expressive Subtests		
formulated sentences	6.48 (2.84)	8.05 (2.09)
recalling sentences	7.48 (2.75)	9.20 (2.46)
sentence assembly	8.43 (2.75)	9.30 (2.13)